

Enriching the Learning Experience of Students Through Peer Interaction

Dong Qin, Provost Teaching and Learning Fellow 2018-2020

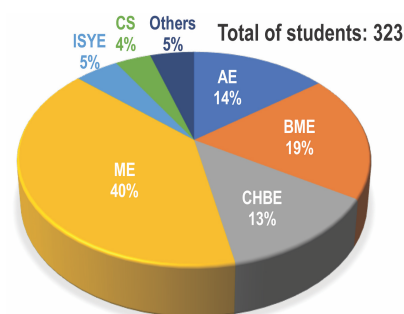
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Introduction

The mission of higher education is to develop independent and creative thinkers who will serve and contribute to the society. Institutions should challenge their students, and faculty alike, to seek new knowledge while deepening their understanding of an ever-changing, multi-dimensional world. As a faculty member at Georgia Tech, Dr. Qin is committed to training her students to be innovative, capable of learning continuously throughout their careers, and able to adapt to changes. Specifically, Dr. Qin is keen to integrate science, engineering, and technology into the undergraduate and graduate curricula for educating students across multiple disciplines. She has been developing an interdisciplinary approach to teaching and research that values the following aspects in the context of materials science and engineering: *i) learning* that exposes students to a multifaceted, integrated path to learn about the fundamentals and new developments in materials science and engineering, as well as its environmental and societal impacts; *ii) training* that offers students research experience in the faculty research lab for the exploration of state-of-the-art research tools and new discoveries in the forefronts of materials science and engineering; and *iii) engaging* that connects the students with community and society to impart and promote a basic conceptual understanding of materials science and engineering by high school students and teachers. The goal is to expand both the scientific and engineering communities by exposing the students to interdisciplinary approaches traditionally exclusive to materials scientists, engineers, chemists, physicists, and biologists.

Curriculum Development

Dr. Qin is passionate to educate the students at all levels with an increased understanding and appreciation of materials science and nanoscale science and technology through student-focused curricula. Since 2015, Dr. Qin has been teaching a core course—MSE 2001, Principles and Applications of Engineering Materials—to a total of 488 non-MSE major engineering students from AE, BME, ChBE, ISYE, ECE, ME, and NE. Dr. Qin constantly refine the syllabus and lecture materials to make this core course attractive and exciting while enriching the students' learning experience regardless of their majors. She puts an emphasis on the structure-property relationship of materials in the context of atoms and chemical bonding by leveraging the student's knowledge of introductory chemistry. She also introduces technology-driven applications of materials through a strong connection to the properties. This course has been well-received, serving as a powerful vehicle to encourage students to consider MSE as a major or minor for their undergraduate training. Part of the success should be credited to the students who shared their "liked" and "disliked" remarks through close interactions with Dr. Qin during the office hours, post-exam surveys, and COIS surveys. The feedback enables Dr. Qin to "learn" from her students, in particular, those who use very different languages in their own disciplines, to implement changes in her lectures for better engaging students in the classroom. For example, Dr. Qin always encourages students to bring their questions to office hours during which she could have another opportunity to explain the concepts. In fact, these questions greatly help Dr. Qin identify the "weak" points in her initial discussion of some key concepts and so she can try a different angle to explain the subjects more clearly. The two-way interactions between the students and teacher have become an essential component in addressing some of the major challenges associated with the teaching of such a large class of students with extremely diversified background and knowledge. It is truly amazing to engage students proactively and work collaboratively with them to achieve effective teaching and learning together. As the Provost Teaching and Learning Fellow (PTLF), Dr. Qin is working on the curriculum refinement of MSE 2001 with ME student population in order to better align the content of MSE 2001 with the ME core courses.



(**Data based on classes of 2016, 2017, and 2019)

Student Success

Since 2012, Dr. Qin always strives her very best to teach all courses with her wholehearted dedication to the success of every student and commitment to fairness. Within a short period of time, Dr. Qin has emerged as one of the most popular teachers for MSE 2001 in the span of 2015 to 2020. Students highly applauded her enthusiasm in teaching the subject and the respect and caring for her students. Dr. Qin always prepares extremely well for each of her lectures, and most important, she is willing to walk extra miles to adjust the lecture content according to student's feedback and remarks during the semester. Dr. Qin provides all possible resources, including lecture slides, important concept sheets, rubric for all quizzes and exams to the T-square/Canvas in a timely fashion. More significantly, Dr. Qin always makes herself available for out-of-class meetings in her office. She truly cares and goes above and beyond to make sure students who are struggling are able to get the help they need. For example, Dr. Qin gives a quiz every week in order to keep the students on top of materials throughout the semester and she always makes rubrics immediately after the quizzes. For the sake of fairness, she carefully reviews each individual copy of student quizzes and exams, even for such a large class with a student population between 70 and 128, before their final scores are posted. Dr. Qin makes herself available to address any questions about grading during office hours or scheduled meetings, from which she is able to achieve a better understanding of the challenges faced by students with different backgrounds. Dr. Qin always encourages the class to participate in after-the-exam survey, including their assessment on the degree of exam difficulty, their expectation on the performance (or grade), and their recommendation on the improvement of teaching effectiveness. For those students who had a poor performance on the exam, Dr. Qin often sends email invitations to schedule individual meetings during office hours or at the students' convenience (even weekends) to reiterate the class materials, work on homework and exam questions, and show them how to improve the performance. Dr. Qin truly values and respects all questions from her students through personal conversations and COIS class surveys, from which she continuously refines her class materials and improves the clarification of her lectures to enrich the learning experience of all students. As a PTLF, Dr. Qin has been engaging with CTL events from which she learns tremendously from CTL staff to further shape her skills in academic well-doing.

Undergraduate Research

In addition to her strong commitment to teaching in the classroom, Dr. Qin enjoys working with undergraduate students and high school students in her own research group. Among 18 undergraduate students who worked in the Qin Lab over the past eight years, five of them coauthored four peer-reviewed publications in the period of 2013-2019; three of them received the Georgia Tech President's Undergraduate Research Award (GT-PURA); and a rising senior student from Duluth High School in Atlanta contributed to a publication in 2012. Remarkably, the original work of the high school student also earned him a semifinalist of the 2013 Intel Science Talent Search and a 2012 semifinalist and regional finalist of the Siemens Competition. Since 2015, Dr. Qin has served as a Grand Challenges Faculty Fellow at Georgia Tech upon nomination by students. She also served as a judge of regional finals at Georgia Institute of Technology for the Siemens's Competition in Math, Science & Technology in 2015 and 2016.

Acknowledgement

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